REMARKS

Reconsideration is respectfully solicited.

Claim 1 has been amended in accordance with the definitions, in the latter sections of the claim, of Q^1,Q^2, and Q^3. Claims 3, 4, and 21 have been amended and Claims 32-34 are based on Claims 3, 4 and 21; Claims 32-34 recite subject matter which is deleted from claims 3-4 and 21. New Claim 35 is based on Claim 13. By these amendments, it is believed that the objection to claim 13 and the rejections under 35 U.S.C 112 and 35 U.S.C. 102 are now moot.

Applicants respectfully traverse the rejections of Claims under 35 U.S.C. 103(a) over Drent [WO 01/68583] in view of Wang et al [US 6348621]. The Examiner correctly notes that the applied references make no mention of two recitations in the process claims at issue. Please note that Wang et al disclose a possible reaction temperature of 20-250°C and pressures from 1 x 10^5 to 100 x 10^5 $N.m^{-2}$. The examiner believes that a skilled person would combine these teachings to experiment with the Drent catalyst system at lower temperatures. The examiner indicates that the skilled person would do this in order to optimise yield, conversion, selectivity, etc.

However, applicants believe there are reasons the skilled person would not proceed in such a manner having read the Drent et al and Wang et al documents. In particular, this is contrary to the teaching in the art and to the teaching of Wang et al.

If a skilled person desirous of finding high linearity reads Drent, he is not taught to optimise below the lower end of the range provided by Drent. He knows that increasing the homologue will require an increase in reaction temp/press to achieve desirable rate. In addition,

Wang tells him that the conditions of Wang do not give good results for propene but do give good results for ethane (col.4 lines 1-5). Accordingly, the skilled person is taught by Wang et al that the reaction conditions are, at the least, not ideal for propene. Accordingly, a skilled person optimising for propene and higher homologues would not look to the conditions of Wang which seem to be optimised for ethylene and in any case may provide insufficient rate for higher homologues.

Further, there are many documents in this field which teach optimisation at higher temperatures and pressures for higher alkenes. The following information which has been provided by the applicant is also contained in the concurrently file INFORMATION DISCLOSURE STATEMENT:

"1. EP 0495 548 PAGE 4 LINES 8-11

"The carbonylation reaction according to the invention is carried out at moderate temperatures and pressures. Suitable reaction temepratures are in the range 50-250C, preferably in the range 75-150C. Reaction temperatures outside these ranges may be applied, but generally do not offer special advantages."

This document which teaches carbonylation using the same family of ligands indicates that there is no value in going below 75C in these systems.

2. The applicant could provide many patents in the area of "carbonylation of ethylenically unsaturated compounds" where the preferred range is above 50C and the preferred pressure is above 5 bar. In all these cases the examples cited will also all be outside of the claimed range.

Hence applicants do not believe there is any teaching in the prior art to look outside of these ranges.

Example patents

US6706912

The carbonylation reaction according to the invention is carried out at moderate temperatures and pressures. Suitable reaction temperatures are in the range of about 50-250.degree. C., preferably in the range of about 80-120.degree. C. The reaction pressure is usually at least atmospheric. Suitable pressures are in the range of about 1 to about 100 bar, preferably in the range of about 5 to about 65 bar.

All examples at 100C and at least 20 bar CO

US6156934

Accordingly, the process is suitably carried out at a temperature in the range of 30 to 200.degree. C., preferred temperatures being in the range of 50 to 180.degree. C. The reaction pressures may also vary widely. For instance, the reaction can be carried out with pressures in the range of 1 to 200 bar gauge, pressures in the range of 5 to 60 barg being preferred.

All examples 90-115C and at least 10bar CO

US6103927

The carbonylation reaction is conveniently carried out at moderate temperatures. Accordingly, the process is suitably carried out at a temperature in the range of 30 to 200.sub.--C., preferred temperatures being in the range of 50 to 180.sub.-- C. The reaction pressures may

also vary widely. For instance, the reaction can be carried out with pressures in the range of 1 to 200 bar gauge, pressures in the range of 5 to 60 barg being preferred.

Examples temp > 125C, CO pressure >10bar

3. It is also generally well known that reaction rate will increase with temperature and hence lowering reaction temp will result in a decrease in rate. This is also relevant to longer chain alkenes where the rate of carbonylation would be expected to be very much lower than that obtained with ethene. The same is also true for CO pressure where higher CO pressure initially results in higher rates.

Note US 6706912 (C3 and above)

The initial rates for butene carbonylation at 30 bar CO and 100C are in the range 170-625 moles product/mole Pd/hour. Whereas the initial rates for octene carbonylation under the same conditions are in the range 60-120 moles product/mole Pd/hour.

US 6156934

Initial rate for ethene carbonylation at 90C is 8000 mol per mole Pd per hour (mol/mol.hr). Initial rate for propene at 100C is 5000 mol/mol.hr. Initial rate for linear C-14 alkene is 250 mol/mol.hr.

Accordingly, the skilled person having read all the relevant technical documents in the field knows that carbonylation temperatures and pressures need to increase as the molecular weight increases to maintain rate. Therefore, the skilled person is taught that he may need to

raise temperature and pressure to achieve equivalent reaction rate as molecular weight increases. In moving from Wang et al which relates to ethylene carbonylation to Drent et al, an invention which relates to higher molecular weight ethylenically unsaturated compounds, the skilled person is not taught to experiment with the lower end of the Wang temperature range but on the contrary, if anything, he will expect to have to increase temperature and pressure to obtain the equivalent reaction rate. Surprisingly, in the present invention, improved selectivity and linearity is found at lower temperatures and pressures.

Accordingly, Wang et al teach that the reaction is "difficult with propene" see col. 4 lines 1-5 indicating that it is inappropriate for propene so that the skilled person would not look to this document for optimization for propene and higher homologues. Still further, the skilled person is taught to raise temperature and pressure to maintain reaction rate when moving to higher homologues so that it does not seem tenable that the skilled person would combine the teachings in the manner indicated by the examiner.

Reconsideration and an early allowance are respectfully solicited

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Respectfully submitted,

By

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